

It would seem that such marked changes as were found in the reaction of the juices of active tissue must affect considerably the metabolic processes, as well as the physical condition of the tissue. CROCKER⁷ has suggested that these changes may be important in the regulation of transpiration by succulents. The lower values are of the same order as those reported in the same work by HEMPEL and also quoted from WAGNER for non-succulent plants. Such P_H values range from 5.4 to somewhat above 6. Slightly alkaline juices are reported by HAAS (*loc cit.*) in the petals of certain flowers; he finds, however, that blue pigments by no means always indicate an alkaline reaction.

As the title suggests, the principal object of the work was to gain some information as to the substances in the plant juices which act as buffers, or regulators of their reaction. On the acid side of the neutral point the following data were obtained for this study: (1) titration to the litmus end point ($P_H=6.8$) compared with the original P_H value; (2) qualitative tests to determine the organic and inorganic acid radicals present; (3) ash analyses to determine the total base present; (4) studies of the reaction and titration values of malic acid salts, and such mixtures of them as appear likely to occur in the plant. The data are most complete for the juices of *Rochea falcata*, *Cotyledon obvallata*, and *C. linguaefolia*. The conclusion is reached that in these plants, and probably in all succulents, the concentration of hydrogen ions is determined by the relation between the quantities of acid and normal malate present.

On the alkaline side of the litmus end point the data may be grouped as follows: (1) titration from the litmus end point to that of phenolphthalein (P_H =about 9.2); (2) determination of nitrogen and in some cases phosphorus; (3) titration experiments with aluminum malate; (4) titration experiments with unknown and variable substances precipitated at the phenolphthalein point. It is concluded that aluminum malate and the unknown substances mentioned are the principal buffers in this region. The nitrogen and phosphorous compounds have very little effect. The titration to the phenolphthalein end point is admitted to be very unreliable. It seems unfortunate that as considerable quantities of the juice were available the electrometric method of titration was not used. Such results would have contributed much to the completeness and accuracy of the data.—THOMAS G. PHILLIPS.

Mutationists and selectionists.—JENNINGS⁸ has attempted to reconcile the views of the "mutationists" and the "selectionists." The latter, headed by CASTLE, have claimed that selection can modify unit characters, and have presented striking evidence on the point. The mutationists have then demonstrated that these data may also be interpreted by assuming that there is but

⁷ CROCKER, WM., *Rev. Bot. Gaz.* 64:526-527. 1917.

⁸ JENNINGS, H. S., *Modifying factors and multiple allelomorphs in relation to the results of selection.* *Amer. Nat.* 51:301-306. 1917.

———, *Observed changes in hereditary characters in relation to evolution.* *Jour. Wash. Acad. Sci.* 7:281-301. 1917.

one basic invariable unit determining the presence or absence of a character, plus numerous modifying factors; the number of the latter present in a given case determines the degree of expression of the character. The author admits that such modifying factors have been demonstrated in *Drosophila*, but goes on to show how "the objections raised by the mutationists to gradual change through selection are breaking down as a result of the thoroughness of the mutationists' own studies." For in *Drosophila* there have gradually been discovered not only 7 modifying factors for eye color, located on different regions of chromatin from the basic factor for eye color, but also 7 grades of the basic factor itself, that is, different conditions of the same unit. "What more does the selectionist want? Is not the controversy at an end?"

There still remains, however, a fundamental difference between the two views. The selectionists claim that these changes (in unit characters) are continuous, and in a definite direction determined by the standard of selection. The mutationists, on the contrary, claim that these changes occur in distinct steps (mutations), and do not occur in any definite order or direction as the result of selection. JENNINGS takes exception to this last claim of the mutationists, and presents some of his work on protozoa, to show the effectiveness of selection in a series of asexual generations.

There is much to be desired in such a reconciliation between the two schools, but more evidence must come in before there can be much hope of bringing it about. At present the views of the mutationists seem to be in better favor, chiefly because they give a much more definite basis for description of the phenomena of inheritance. "If one creates a hypothetical unit by which to describe phenomena and this unit varies, he really has no basis for description (EAST)."—MERLE C. COULTER.

Narcotic plants and stimulants.—SAFFORD⁹ has published a very instructive account of plants used by the "ancient Americans" as sources of narcotics and stimulants long before the discovery of America. He indicates 13 such plants as chiefly in use, among them *Nicotiana*, *Datura Stramonium* (a source of atropine), *Erythroxylon Coca* (a source of cocaine). Other plants of minor importance are also noted. In concluding the summary, the following statement is made: "In view of the shortage of medicinal alkaloids resulting from the present war, it is suggested that investigations be made to determine the nature of the properties of these less-known narcotics, with a view to their utilization as substitutes for others now recognized in the standard pharmacopoeias."—J. M. C.

⁹ SAFFORD, W. E., Narcotic plants and stimulants of the ancient Americans. *Smithson. Rep.* 1916. pp. 387-424. *pls.* 17. 1917.